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Comparison of kinematic and dynamic leg trajectory optimization techniques for biped robot locomotion

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Abstract

The paper presents comparison analysis of two approaches in defining leg trajectories for biped locomotion. The first one operates only with kinematic limitations of leg joints and finds the maximum possible locomotion speed for given limits. The second approach defines leg trajectories from the dynamic stability point of view and utilizes ZMP criteria. We show that two methods give different trajectories and demonstrate that trajectories based on pure dynamic optimization cannot be realized due to joint limits. Kinematic optimization provides unstable solution which can be balanced by upper body movement.

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